Masthead Logo

The Palimpsest

Volume 18 | Number 2

Article 3

2-1-1937

# The Leonid Shower of 1867

Ben Hur Wilson

## The Leonid Shower of 1867

"Stars fell on Alabama," more than one hundred years ago, on November 13, 1833, in such vast numbers that the "sky was as full of them as it ever is of snowflakes in a storm," declared an old lady who described the phenomena. The heavens "looked like a giant umbrella." The tip of this umbrella seemed to rest in the constellation "Leo", from which point a majority of the "falling stars" appeared to radiate. Hence the name, "Leonids". Stars fell on Iowa also in 1833, but only the earliest of the white settlers were present to witness the event.

Realizing that as many as 200,000 meteors per hour, over a period of five or six hours from midnight till dawn, were visible from a single vantage point, it is not hard to believe that the sight struck terror into the hearts of ignorant colored slaves of the southern States, and that many of their more sophisticated white masters were only slightly less alarmed. It is not surprising that the story of the "falling stars", like that of the flood, has been handed down from generation to generation.

This "star shower" was not entirely unexpected, for a similar one had been noted in No-

vember, 1799, and others previously at regular intervals of thirty-three or thirty-four years. From these observations and astronomical calculations, the Leonids were attributed to a swarm of meteoric material flowing through space along the path of an old, partially disintegrated comet, known as Tempel's comet, to which they apparently bore definite relation. It was therefore confidently predicted that a recurrence of the Leonids would take place during November, 1866 or 1867, at which time the earth, revolving in its orbit, was scheduled to pass through the region in space infested with these remnants of "Tempel's" head.

As the date approached, students and teachers in the colleges and universities manifested unusual interest in astronomical matters. At Iowa City a course in astronomy was being offered at the State University, under the tutelage of Professor Nathan R. Leonard. Of the earlier workers in Iowa meteoric research, Leonard undoubtedly ranks first. He was skilled in mathematics, scientific in his attitude toward learning, and tremendously interested in current affairs. It is not surprising that he should contribute to astronomical history by his meticulous investigation of the Leonids of 1867. Leonard and the Leonids — what's in a name?

American observers were alert in 1866, but the

Leonid shower that year was disappointing. In Europe, however, the meteoric display on November 13th was remarkable. A year later to the day, America witnessed a shower which, while not comparable to the magnificent one of 1833, was of sufficient importance to make it memorable. In a long detailed report addressed to H. H. Brainerd, the editor of the Iowa City *Republican,* on November 20, 1867, Professor Leonard described the phenomenon and his methods of observation. Most of this letter, as published in the *Republican* for the benefit of "our citizens who were so unfortunate as not to be witnesses of the great Meteoric shower of the night of November 13-14," is here reproduced.

Some weeks since [wrote Professor Leonard], in the anticipation of such an event, a company of thirty or forty students was formed — mostly composed of members of the Franklin Scientific Association — and from the Sophomore and Junior Classes of the University — having for their object the noting of the *Number, Direction, Period of Visibility* and *Lengths of Arc* that might be described by the most brilliant meteors — together with other such items as they might have time or opportunity to notice.

After spending a few evenings in tracing out the constellations — the look out was commenced

on Saturday, Nov. 9, with a view, first to *practice,* and second, to ascertain whether there was any gradual increase in the number of falling stars — extending over a period of several days previous to the shower. As a result we have not found, save on the mornings of Saturday and Tuesday, any more than on any ordinary night in the presence of the full moon.

From the commencement of their watching, until the evening of the 13th, only four observers were out at a time — or one for each point of the compass. On that evening they all assembled at my recitation room — and were divided into three sections, consisting of 12 each, and assigned respectively to watches, from 10–12, 12–2, and 2–4.

The position chosen was the octagonal room, in the second story of the cupola of the University Hall [Old Capitol], where you may notice that there is a window at the middle of each side, with an exterior column on either side of it, so that when the blinds and sash were removed, an observer, placed within, could view just one eighth of the sky.

At a few minutes before 10, the first section took their places — one at each window, two in a reclining position on the projection outside, to keep watch near the zenith — one within at a

desk, with lantern and paper previously ruled in columns for the purpose, to keep a record of the observations; and the twelfth to act as occasion might require. The columns were headed thus:

| Quarter of Compass. | Direction of Motion. | Confor-mity. | Time Visible. | Arc of Motion. | Remarks |
|---|---|---|---|---|---|

Everything being in readiness, the work began at 10 o'clock. A short time before 12 o'clock the second section were called up so as to take their places promptly at the expiration of the hour.

At 20 minutes before 1 o'clock, it was found that one person could not record fast enough, and the unemployed men undertook the record for one half of the circuit.

Second section relieved punctually at 2 o'clock. At quarter past two, both recorders were unable to keep a full record, and from this time forward each observer counted to himself the number appearing in his quarter, and only called out the most remarkable for record. At this point, in accordance with previous arrangement, the University bell was rung to awaken students and citizens — soon the Church bells joined in, and even the bell down on Mechanics' Academy contributed to the general effort to call everybody up to witness the exhibition. Sometime before 3 o'clock, a second observer took his place at the S. E. and soon after a second upon the east.

The following table shows the result of the count for each hour. The meteors were classified according to their conformity and non-conformity to a direction proceeding from the constellation of Leo.

| Hours | Conformity | Unconformity | Total | Remarks |
|---|---|---|---|---|
| 10–11 | 2 | 5 | 7 | Prospect poor, a little hazy, with light clouds. |
| 11–12 | 2 | 6 | 12 | Squad inclined to doubt whether there would be a shower. Clear. |
| 12–1 | 35 | 16 | 51 | Better — Quite clear. |
| 1–2 | 102 | 17 | 119 | Better still — Quite clear. |
| 2–4 | nearly all | | 5000 | Actually counted 4748. Not counted on W. Quarter. |

Note here the great increase in the proportion of conformable meteors. Out of 1638 seen by three observers, viz. Messrs. Wilson, Glass and Greene, only 22 were thought to be unconformable — that is, not coming from the point of the radiant.

In regard to the color, it is my impression that

of the hundreds that left trains behind them — the greater number seemed to be of a green color — very many yellow at the middle and gradually changing to green at the margin — a color a little darker than the flame of the metal barium, and not far from the hue of copperas. On comparing this statement with the views of several observers, I find all agreeing thereto.

The time of maximum activity was from 3 o'clock, 15 min. to 3:40. Messrs. Glass and W. D. Wilson on the S. E. quarter counted by hundreds, keeping the time of each hundred, commencing at 3 o'clock by their watch, which was 7½ minutes fast. The following is the result: 1st 100 counted in 7 minutes; 2d in 5, 3d in 6, 4th in 3, 5th in 3, 6th in 3, 7th in 2, 8th in 2, 9th in 2½, 10th in 4, and 11th in 10 minutes. Closing at 3:55 by their time, or at 3:47½ true time. It will be seen by adding the times of the various 100's that they lost 7½ minutes during their counting. Most of this occurred at 3:31 by their time, after the counting of the 8th 100, when, in consequence of the great number that appeared, they were unable to keep a reliable count. From this, it would seem that the true period of maximum was about at 3½ o'clock, and not only that, but that the decrease was far more rapid after the maximum than the increase had been before.

During the hour from 3 to 4, and also after 4, parties of 9 each were formed on the college campus, for the purpose of counting those that issued from Leo, and they found on an average about 40 per minute during the time from 3:15 to 3:40.

There was a very fine opportunity to determine the position of the *Radiant,* or position from which they seemed to proceed. According to observations made at a quarter past three o'clock, this radiant was a very well defined *point,* close to the star 97, in the sickle of the constellation *Leo.* At about half past 3, the radiant seemed to be a short line or at most a very narrow ellipse, having this star for its center, and extending a short distance in either way in the direction of the star Zeta.

This it will be seen agrees with that observed by Prof. Watson, of Michigan University; but disagrees, by about 5 degrees, with that obtained at Washington, D. C. It may be possible that this difference is due to a difference of latitude in the stations. At all events, it cannot be doubted that our result is the *true one for this place.*

There were several particular observations taken. The first to be mentioned is, that in some instances a separation took place between the meteor and its train, before the former disappeared.

At 9 minutes to 3, a meteor started from the

radiant and proceeded directly over the star Dubhe (the northernmost of the two pointers), followed by a broad train about 5 degrees long. The separation of the meteor and train took place just as the former crossed the star named. The train remained visible for the space of 4 minutes, drifting meanwhile to the S. E., shortening up as it went, without, however, growing much, if any, narrower, and disappeared after retreating about 7 degrees. The last glimpses that I had of it, gave me the idea of a spiral form, but I could not be very positive about it.

At 4 minutes to 3, another meteor left the radiant and proceeded to the star *Zeta Draconis,* leaving there a train, behaving just as the last described, retreating 2 degrees in 3 minutes. At 3 minutes after 3, another passed over *Mizar* (the middle star in the handle of the Dipper), leaving there a train that retreated 1½ degrees in 2 minutes.

At 8 minutes after 3, a very large meteor passed over to the head of Orion, leaving there a train 11 degrees long, and almost immediately afterward was seen to separate into several parts and disappear. The train floated a little to the east of south, a distance of 11 degrees, the middle moving more rapidly than the extremities, so that it took up the form of a crescent, with the horns pointing

N. W. It should be noted that this train appeared near to the full moon, so that its period of visibility was thereby much shortened. From this train, before the separation, one observer thought he saw three small black streaks descending for a short distance, and curved backward toward the bottom.

At 1 minute after 4, another meteor passed over to Sirius, leaving, midway from Leo, a train that exhibited the same movements as the last, giving the crescent shape before disappearance.

A change of course in the path of a meteor, was carefully noted in one instance. A little after 3½ o'clock, a deep red meteor was seen passing very rapidly through Leo Minor, toward the N. W. describing an arc of 15 degrees in ¼ of a second. About midway of its course, it turned abruptly toward the west, at an angle of 15 or 20 degrees, with its previous direction.

Several bright meteors were seen to *flash out,* remain stationary, or nearly so, for an instant and then disappear. As a rule, it may be stated that the nearer these were to the radiant point, the less was their motion.

The length that this communication has already attained forbids a further description of our observations. One or two remarks must suffice for the present, and first: We may regard the posi-

tion of the *radiant* as fixed — which gives the inclination of the meteoric stream to the orbit of the earth, 22 degrees. Second — The breadth of the stream crossed from 2 hours 15 minutes, to 4 hours 15 minutes, not far from 40,000 miles, or that of the denser part crossed from 3:15 to 3:40, about 7000 miles.

Third — In consequence of the presence of the full moon, and the impossibility of counting all that appeared, the number obtained (about 5300) does not represent more than one twentieth of those that would have been visible had the night been perfectly clear and the moon absent.

The height and velocity of some of the brightest, we hope may be ascertained as soon as we can compare our record with those made elsewhere.

In conclusion, it is but just to mention the faithfulness with which the young gentlemen fulfilled the duties assigned them — keeping calm amid the general excitement, and each one denying himself a comprehensive view of the whole phenomena, devoted his attention to his own specific work. They have their reward in the consciousness of having done what they could for the advancement of science, and the gratification of having secured, so far as we know at present, the fullest series of observations that have been made of this meteoric shower. To any one who witnessed the scene, I

need not say that it was a *grand* one. When hundreds of these celestial visitants, with their brilliant streamers, were every moment flashing across the sky, that soul must be calm indeed that could contemplate the spectacle without emotion. Surely, no one that saw it will ever forget the morning of November 14, 1867.

BEN HUR WILSON